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Recent Discoveries from the Anglo-Australian Planet Search

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Abstract. We present the latest precision radial velocity results from the Anglo Australian Planet Search. These include new planet mass companions to HD 216437, HD 196050, HD 30177, HD 73526, and HD 2039, as well as evidence for a second companion to HD 160691 residing in a long period orbit. The results come from a sample of $\sim$ 200 nearby inactive FGKM dwarfs with V<7.5 and a subsample of 20 more distant metal rich stars. At least 25 $\pm$ 11% of metal rich stars appear to have planets within 2.5 AU, somewhat more than the 8% of stars which appear to have planets within 3.5 AU.

1. Introduction

In January 1998, The Anglo Australian Planet Search (AAPS) began to survey 200 nearby FGKM stars with a precision of $\sim$3 m/s using the UCLES spectrometer on the 3.9 m Anglo-Australian Telescope (AAT) in New South Wales. Early discoveries include a 51 Peg-like companion to HD 179949, and long (>1 yr) period companions to HD 160691, and HD 27442 (ϵ Ret), the latter being the first known single planet beyond 0.15 AU in a circular orbit. (Papers I,II).[1]

This year, the AAPS presented another example of an ϵ Ret-like planet, orbiting HD 23079 in a nearly circular orbit at 1.5 AU, another eccentric giant planet orbiting HD 142 annually (Paper III), and a companion to HD 39091 on the planet/brown dwarf boundary with $M \sin i = 10.3$ M_{JUP} (Paper IV).

AAPS data have also been used to confirm the presence of four separate jovian-mass companions (Paper II) and *one* saturn-mass companion (to HD 83443, Paper V).

2. New Discoveries

Here we present the discovery of 5 new long period (p>180 days) planets around 5 different stars, plus evidence for a very-long period companion to HD 160691, which has a known planet (Paper II).

[1]A complete listing of AAT planet discoveries, and published papers can be found at: http://www.aao.gov.au/local/www/cgt/planet/aapsplanets.html

AAPS Planet Discoveries

Star	Sp. Type	[Fe/H]	M sin i (Mj)	Per. (d)	a (AU)	e	Reference
HD179949	F8V	0.22	0.84	3.1	0.045	0.05	Paper I
HD160691	G5V	0.28	1.7	637	1.5	0.31	Paper II
HD27442	K2IVa	0.22	1.26	426	1.1	0.02	Paper II
HD142	G1IV	0.04	1.03	339	1	0.37	Paper III
HD23079	F8/G0V	0.25	2.5	626	1.5	0.02	Paper III
HD39091	G3IV	0.09	10.3	2,083	3.34	0.62	Paper IV
HD30177	G8V	0.2	7.7	1,620	2.6	0.22	Tinney, et al 2002
HD73526	G6V	0.11	3.1	186.89	0.65	0.408	Tinney, et al 2002
HD196050	G3V	0.3	2.7	2.85y	2.5	0.29	Jones, et al 2002b
HD216437	G4IV-V	0.3	1.9	3.55y	2.7	0.32	Jones, et al 2002b
HD2039	G2/3 IV/V	0.1	4.3	3.3	0.491	0.65	Tinney, et al 2002

All papers available at: http://www.aao.gov.au/local/www/cgt/planet/aat.html

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Figure 1. Summary of Anglo Australian Planet Search Discoveries

HD 216437 and HD 196050 both have Keplerian velocity variations consistent with planets in $\sim$ 3.5 year orbits, with minimum masses of 2.2 and 2.8 M_{JUP} , respectively. Additional data on HD 160691 and an improved orbital fit suggest a second companion of as yet undetermined mass and period. These results are reported in Paper VI.

We also report the discovery of planetary companions to HD 30177 and HD 73526. The masses of the companions range from $M \sin i = 3.0$ to 7.9 M_{JUP} , as listed in Figure 1. All of the aforementioned new discoveries were reported June 13, 2002.[2] In addition, we announce the discovery of a planetary companion to HD 2039, with mass $(M \sin i) = 4.8$ M_{JUP}, orbiting at 2.2 AU. Radial velocities for HD 2039 are shown in Figure 2.

HD 2039, HD 30177 and HD 73526 come from the more distant high metallicity subsample of 20 stars. The scatter about the Keplerian fits for these fainter stars is larger than our typical precision of $\sim$ 3 m/s, consistent with photon statistics.

3. Conclusion

The Anglo Australian Planet Search has now detected 12 planet-mass companions and one brown dwarf-mass companion, out of $\sim$ 200 stars being surveyed. Fully 25% of our subsample of metal rich stars have yielded planets, and more are likely to emerge. This fraction exceeds the $\sim$ 8% field stars with known extraso-

[2]Radial velocity plots, and other data can be found at:
http://www.aao.gov.au/local/www/cgt/planet/pressing/jun02.html

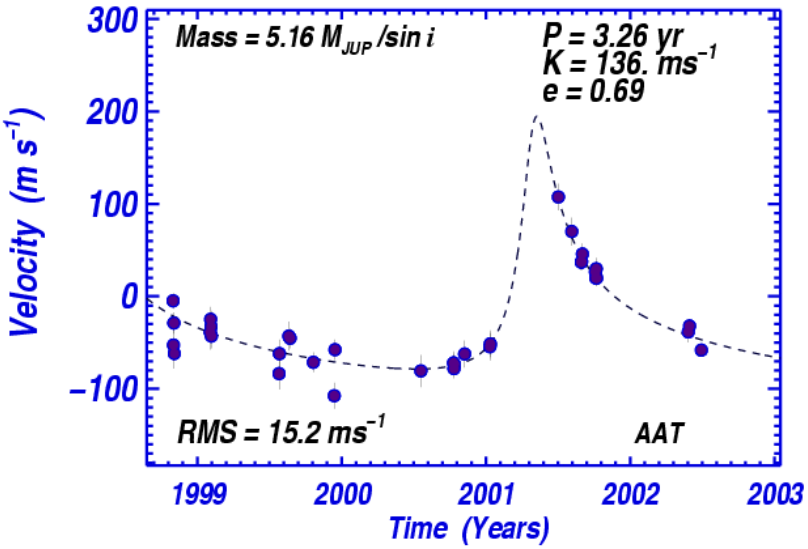

Figure 2. Radial Velocities for HD 2039, one of 20 stars in a more distant, high metallicity subsample. The faintness of the star precludes measurement at our usual velocity precision of 3 m/s

lar planets within 3.5 AU. The exact cause(s) of this "metallicity enhancement" remains an interesting theoretical question.

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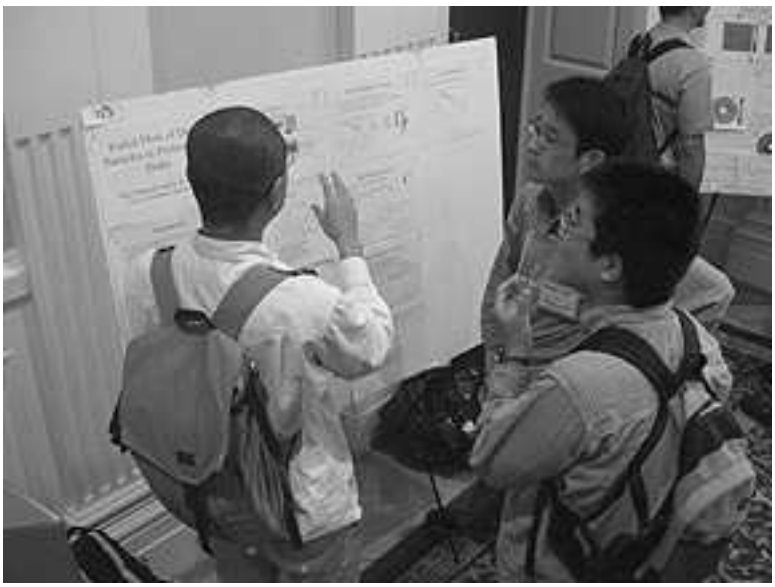

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